

Worksheet 1. Contact and Methyl Bromide Request Information

The following information will be used to determine the amount of methyl bromide requested and the contact person for this request. It is important that we know whom to contact in case we need additional information during the review of the application.

1. Location

(Enter the state, region, or county. Provide more detail about the location if relevant to the feasibility of alternatives to methyl bromide.)

California

2. Crop/commodity

(Include all crops/commodities that benefit from the application of methyl bromide in a fumigation cycle. A fumigation cycle is the period of time between methyl bromide fumigations.)

Stone fruit (nectarine, peach, cherry, plum, prune) - replant

3. Climate

(Individual users should enter their climate zone designation by reviewing the U.S. climate zone map. If a consortium is submitting this application, please indicate the estimated percentage of consortium users in each climate zone. This map is located at the end of this workbook or it can be reviewed online at <http://www.usna.usda.gov/Hardzone/ushzmap.html>).

9a (50%), 9b (54%)

4. Soil type Check the box(es) for the soil types and percent organic matter that apply to your area. If a consortium is submitting this application, please indicate the estimated percentage of consortium users in each soil type.

Soil Type:	Light <u>33%</u>	Medium <u>33%</u>	Heavy <u>33%</u>
Organic Matter:	0 to 2% <u>X</u>	2 to 5 % <u> </u>	over 5% <u> </u>

5. Other geographic factors that may affect crop/commodity yield (e.g., water table).

6. Consortium name California Grape & Tree Fruit League **Specialty (check one)**

7. Contact name Alexander J. Ott agronomic X

8. Address 1540 E. Shaw, Suite 120 economic

Fresno, CA93710-8000

9. Daytime phone 559.226.6330 **10. FAX** 559.222.8326

11. E-mail Aott@cgtf.com

List an additional contact person if available.

Specialty (check one)

12. Contact name Gary Obenauf agronomic X

13. Address 144 Peace River Drive economic

Fresno, CA 93711-6953

14. Daytime phone 559.447.2127 **15. FAX** 559.436.0692

16. E-mail gobenauf@agresearch.nu

Worksheet 1. Contact and Methyl Bromide Request Information

For EPA Use Only
ID#

17. How much active ingredient (ai) of methyl bromide are you requesting for 2005? 1,579,500 lbs.

If a consortium is submitting this application, the data for question 17 and 17a. should be the total for the consortium.

In the question below, area is defined as follows for each user: acres for growers, cubic feet for post harvest operations, and square feet for structural applications.

17a. How much area will this be applied to? Please list units. 8100 Ac units

18. Are you requesting methyl bromide for additional years beyond 2005? Yes X No

18a. If yes, please list year and quantity active ingredient (ai) of methyl bromide requested in the table below and explain why you need authorization for multiple years.

Current alternatives are not as effective as MeBr and some lack commercially available means to effectively deliver material. One application of methyl bromide will provide benefits over a 20 - 25 year period, during the life of an orchard. It has been estimated that a 25% loss in production efficiency will occur with the loss of methyl bromide (Dr. Mike McKenry, University of California, Riverside; "The Replant Problem and Its Management". (See comment in 20a)

If a consortium is submitting this application, the data below should be the total for the consortium.

In the table below, **area is defined** as follows for each user: acres for growers, cubic feet for post harvest operations, and square feet for structural applications.

Year	Quantity ai (lb.) of Methyl Bromide	Area to be Treated	Unit of Area Treated
2006	1,579,500	8100	acres
2007	1,579,500	8100	acres

19. Target Pest(s) or Pest Problem(s):

(Be as specific as possible about the species or classes of pests relevant to the feasibility of alternatives.)

Replant Disorder (unknown disorder thought to result from a complex of major and minor soil-borne organisms).

Root knot nematode (Meloidogyne spp.), Ring nematode (Criconemella xenoplax), Dagger nematodes (Xiphinema spp.),

Root lesion nematode (Pratylenchus vulnus), Citrus nematode (Tylenchus semipenetrans).

20. If applying as a consortium for many users of methyl bromide, please define a **representative user**. Define exactly, issues such as size of the operation (acres treated with methyl bromide for growers, cubic feet for post-harvest operations, and square feet for structural applications), whether the representative user owns or rents the land or operation, intensity of methyl bromide use (treat regularly or only when pest reaches a threshold), pest pressure, etc.

Owner of 80-100 acres of land on which any particular stone fruit commodity is planted on only a portion. Methyl bromide is used when replanting trees or orchards, the life of which is 20 - 25 years.

20a. Explain why this user represents the typical user in the consortium.

Typical profile by University of California Cooperative Extension sample costs to establish various orchards.

COMMENT. PUR data does not appear to accurately report normal use rates. Methyl Bromide request based on following:

8100 acres X 65% treated area (strip fumigated) X 300 lbs. per acre = 1,579,500 lbs.

Worksheet 2-A. Methyl Bromide - Use 1997-2000

If a consortium is submitting this application, all data should reflect the actual data for the consortium.												
Col A: Formulation of Methyl Bromide	Enter the appropriate data in Col B-M for each formulation, if known, and/or the totals and averages for all formulations. If you enter only the total and averages for all formulations in the last row of the table, please describe in the comments section the formulations typically used, or the approximate proportions of the formulations used.											
Col B, E, H, K: Actual Area Treated	Enter the total actual area treated. Note: This number should be the <u>total actual</u> area treated by the individual user or total actual area for the entire consortium, for the year indicated.											
Col C, F, I, L: Actual Total lbs. ai of Methyl Bromide Applied	Enter the actual total pounds active ingredient (ai) of methyl bromide applied. Note: This number should be the total pounds ai applied by the individual user or the entire consortium, for the year indicated.											
Col D, G, J, M: Actual Average lbs. ai Applied per Area	The average application rates in pounds ai of methyl bromide per area are automatically calculated from the previous 2 columns.											
Area is defined below as follows for each user: acres for growers, cubic feet for post-harvest operations, and square feet for structural applications.												
A	B	C	D	E	F	G	H	I	J	K	L	M
Formulation of Methyl Bromide	1997			1998			1999			2000		
	Total Actual Area Treated	Actual Total lbs. ai of Methyl Bromide Applied	Average lbs. ai Applied per Area	Total Actual Area Treated	Actual Total lbs. ai of Methyl Bromide Applied	Average lbs. ai Applied per Area	Total Actual Area Treated	Actual Total lbs. ai of Methyl Bromide Applied	Average lbs. ai Applied per Area	Total Actual Area Treated	Actual Total lbs. ai of Methyl Bromide Applied	Average lbs. ai Applied per Area
over 95% methyl bromide	8489.19	645057	75.9856947	6956.41	480934	69.135373	8703.79	514872	59.1549199	4256.79	117678	27.64
75% methyl bromide, 25% chloropicrin												
67% methyl bromide, 33% chloropicrin												
50% methyl bromide, 50% chloropicrin												
__% methyl bromide, __% chloropicrin												
__% methyl bromide, __% chloropicrin												
All formulations of methyl bromide			75.9856947			69.135373			59.1549199			27.64
<p>Comments: Source - California Pesticide Use Report. Above reflects combined data for peach (freestone), nectarine, cherry, plum and prune.</p> <p style="text-align:center">NOTE: The rate is typically 300 to 350 lbs per acre. The PUR does not appear to accurately report actual usage.</p>												

Worksheet 2-B. Methyl Bromide - Crop/Commodity Yield and Gross Revenue 1997-2000

If a consortium is submitting this application, the data for this table should reflect the actual averages for the consortium.	
The purpose of this worksheet is to estimate the gross revenue for 1997 - 2000 when using methyl bromide. Post-harvest and structural users may work with EPA to modify this form to accommodate differences in operations when providing gross revenue data.	
Col. A: Year	Be sure to enter the year. Use as many rows as needed for each year for all the crops/commodities in the fumigation cycles from 1997 to 2000. If a fumigation cycle overlaps more than one calendar year, then the year of the fumigation cycle is the year me
Col. B: Crop/Commodity	Enter all crops/commodities that benefit from methyl bromide in each fumigation cycle. (For example, if normally methyl bromide is applied and tomatoes are grown and harvested followed by peppers without an additional treatment of methyl bromide, then bo If someone other than the applicant benefits from the application of methyl bromide in the fumigation cycle and you do not have the quantitative data for the crops grown on the same land, please indicate so in the comments section below.
Col. C: Unit of Crop/Commodity	Enter the unit of measurement for each crop/commodity.
Col. D: Crop/Commodity Yield	Enter the number of units of crop/commodities produced per area.
Col. E: Price	Enter the average prices received by the users for the year and crop/commodity indicated (1997-2000).
Col. F: Revenue	This number is calculated automatically using the values you entered in Cols. D and E. You may override the formula to enter a different revenue. Please explain why the revenue amount is different in the comment section below.
Total Revenue for 1997-2000	Enter the total revenue per year by adding the revenue for all crops for that year.
Average Revenue per Year:	The average revenue per year is calculated automatically using the summary data you enter for each year.

Area is defined below as follows for each user: acres for growers, cubic feet for post-harvest operations, and square feet for structural applications.

A	B	C	D	E	F
Year Methyl Bromide was Applied	Crop/Commodity	Unit of Crop/Commodity (e.g., pounds, bushels)	Crop/Commodity Yield (Units per acre)	Price (per unit of crop/commodity)	Revenue (per area)
1997	Prune	Tons	2.07	\$ 883.00	\$ 1,827.81
1998	Prune	Tons	0.99	\$ 764.00	\$ 756.36
1999	Prune	Tons	1.7	\$ 861.00	\$ 1,463.70
2000	Prune	Tons	2.17	\$ 770.00	\$ 1,670.90
					\$ 0.00
					\$ 0.00
					\$ 0.00
					\$ 0.00
					\$ 0.00
					\$ 0.00
					\$ 0.00
					\$ 0.00
				Total Revenue for 1997	\$ 1,827.81
				Total Revenue for 1998	\$ 756.36
				Total Revenue for 1999	\$ 1,463.70
				Total Revenue for 2000	\$ 1,670.90
				Average Revenue Per Year	\$ 1,429.69

Comments: Source - NASS

Worksheet 2-B. Methyl Bromide - Crop/Commodity Yield and Gross Revenue 1997-2000

If a consortium is submitting this application, the data for this table should reflect the actual averages for the consortium.	
The purpose of this worksheet is to estimate the gross revenue for 1997 - 2000 when using methyl bromide. Post-harvest and structural users may work with EPA to modify this form to accommodate differences in operations when providing gross revenue data.	
Col. A: Year	Be sure to enter the year. Use as many rows as needed for each year for all the crops/commodities in the fumigation cycles from 1997 to 2000. If a fumigation cycle overlaps more than one calendar year, then the year of the fumigation cycle is the year me
Col. B: Crop/Commodity	Enter all crops/commodities that benefit from methyl bromide in each fumigation cycle. (For example, if normally methyl bromide is applied and tomatoes are grown and harvested followed by peppers without an additional treatment of methyl bromide, then bo If someone other than the applicant benefits from the application of methyl bromide in the fumigation cycle and you do not have the quantitative data for the crops grown on the same land, please indicate so in the comments section below.
Col. C: Unit of Crop/Commodity	Enter the unit of measurement for each crop/commodity.
Col. D: Crop/Commodity Yield	Enter the number of units of crop/commodities produced per area.
Col. E: Price	Enter the average prices received by the users for the year and crop/commodity indicated (1997-2000).
Col. F: Revenue	This number is calculated automatically using the values you entered in Cols. D and E. You may override the formula to enter a different revenue. Please explain why the revenue amount is different in the comment section below.
Total Revenue for 1997-2000	Enter the total revenue per year by adding the revenue for all crops for that year.
Average Revenue per Year:	The average revenue per year is calculated automatically using the summary data you enter for each year.

Area is defined below as follows for each user: acres for growers, cubic feet for post-harvest operations, and square feet for structural applications.

A	B	C	D	E	F
Year Methyl Bromide was Applied	Crop/Commodity	Unit of Crop/Commodity (e.g., pounds, bushels)	Crop/Commodity Yield (Units per acre)	Price (per unit of crop/commodity)	Revenue (per area)
1997	Nectarines	Tons	7.33	\$ 375.00	\$ 2,748.75
1998	Nectarines	Tons	6.31	\$ 471.00	\$ 2,972.01
1999	Nectarines	Tons	7.72	\$ 411.00	\$ 3,172.92
2000	Nectarines	Tons	7.52	\$ 398.00	\$ 2,992.96
					\$ 0.00
					\$ 0.00
					\$ 0.00
					\$ 0.00
					\$ 0.00
					\$ 0.00
					\$ 0.00
					\$ 0.00
				Total Revenue for 1997	\$ 2,748.75
				Total Revenue for 1998	\$ 2,972.01
				Total Revenue for 1999	\$ 3,172.92
				Total Revenue for 2000	\$ 2,992.96
				Average Revenue Per Year	\$ 2,971.66

Comments:

Worksheet 2-D. Methyl Bromide - Use and Costs for 2001

If a consortium is submitting this application, the data in Cols. B, C, D, and E should reflect the *representative user* in the consortium. The data in Col. F should reflect the **actual** area treated by all users in the consortium.

If the methyl bromide is custom applied then put the cost per area in Column G and fill in the average lb ai of methyl bromide applied per area (Col B) and the Total Actual Area Treated (Col F).

If 2001 was not a typical year for the individual or for the representative user of a consortium, the applicant may provide additional data for a different year. However, all applicants must complete this worksheet for the year 2001 regardless. If you provide an additional year's data, please explain in the comment section at the bottom of the worksheet why 2001 is not considered a typical year.

Col. A: Formulation of Methyl Bromide	Enter the appropriate data in Col B-G for each formulation, if known, and/or the totals and averages for all formulations of methyl bromide. If you just enter data in the bottom row in the table (All formulations of methyl bromide), please describe in the comments, the relative usage of the various formulations, to the extent known.
Col B: Average lbs. active ingredient (ai) of Methyl Bromide Applied per Area	Enter the average pounds active ingredient (ai) of methyl bromide applied per area.
Cols. C, D, E, G: Prices and Costs	Enter the average price per pound active ingredient (ai) of methyl bromide in Col. C and the average cost of applying methyl bromide per area treated in Col. D. In Col. E, enter the average other costs per area associated with applying methyl bromide (e.g., tarps). Column G will be calculated automatically using the values you entered in columns B-E. If methyl bromide is custom applied, enter the cost per area in Col. G and fill in Cols. B and F.
Col. F: Actual Area Treated	Enter the actual area treated. Note: This number should be the total area treated by all users in the consortium.

Area is defined below as follows for each user: acres for growers, cubic feet for post-harvest operations, and square feet for structural applications.

A	B	C	D	E	F	G
Formulation of Methyl Bromide	Lb. ai of Methyl Bromide Applied per Area (2001 Average)	Price per lb. ai of Methyl Bromide (2001 Average)	Cost of Applying Pesticide per Area (2001 Average)	Other MBr Costs (e.g. tarps, etc.) per Area (2001 Average)	Total Actual Area Treated in the Consortium	Cost per Area
over 95% methyl bromide	200	\$ 4.00	\$ 200.00			\$ 1,000.00
75% methyl bromide, 25% chloropicrin						\$ 0.00
67% methyl bromide, 33% chloropicrin						\$ 0.00
50% methyl bromide, 50% chloropicrin						\$ 0.00
__% methyl bromide, __% chloropicrin						\$ 0.00
__% methyl bromide, __% chloropicrin						\$ 0.00
						\$ 0.00
All formulations of methyl bromide						\$ 1,000.00

Comments:

Worksheet 2-E. Methyl Bromide - Other Operating Costs for 2001

Do not include methyl bromide costs.											
If a consortium is submitting this application, the data for this table should reflect a representative user .											
Enter all operating costs except methyl bromide costs incurred during the fumigation cycle (interval between fumigations) beginning in 2001. See the Fumigation Cycle Worksheet for a comprehensive definition of the fumigation cycle. Enter these costs in Col B for custom operations, or in Col C and D for operations done by user.											
Submit crop budgets for each crop, if available. You may submit crop budgets electronically or in hard copy. If your costs are significantly different than the crop budgets, please explain in the comments.											
Col A: Operation	Identify in Col A the operations (except methyl bromide) to which the costs apply. For growers, these operations should include but are not limited to (1) prepare soil, (2) fertilize, (3) irrigate, (4) plant, (5) harvest, (6) other pest controls, etc. You must include all other operating costs.										
Col B: Custom Operation Cost	If you incur custom operation costs, enter those costs in Col. B.										
Col C: Material Cost per Area	If you do not incur custom operation costs, enter the material cost per area.										
Col D: Labor Cost per Area	If you do not incur custom operation costs, enter the labor cost per area.										
Col E: Total Cost per Area	The total cost per area is calculated automatically from the values you enter in Cols. C and D.										
Col F: Typical Equipment Used	Identify the typical equipment used for operations done by user. Please be specific, such as tractor horsepower. No cost data is required in this column.										
Area is defined below as follows for each user: acres for growers, cubic feet for post-harvest operations, and square feet for structural applications.											
A		B		C		D		E		F	
Operation		Custom Operation Cost per Area		Operation Done by User							
				Material Cost per Area		Labor Cost per Area		Total Cost per Acre		Typical Equipment Used	
Planting				\$ 974.00		\$ 577.00		\$ 1,551.00			
Cultural								\$ 367.00			
								\$ 0.00			
								\$ 0.00			
								\$ 0.00			
								\$ 0.00			
								\$ 0.00			
								\$ 0.00			
								\$ 0.00			
								\$ 0.00			
								\$ 0.00			
								\$ 0.00			
								\$ 0.00			
								\$ 0.00			
Total Custom per Area		\$ 0.00				User Total per area		\$ 1,918.00			
Peach/Nectarine operating costs are used as representative of stone fruit establishment costs. Source: University of California Cooperative Extension											
NOTE: THESE ARE FIRST YEAR COSTS ONLY, NOT FOR FUMIGATION CYCLE WHICH CAN BE FOR A 20 YEAR PERIOD. METHYL BROMIDE USED ONLY PRIOR TO PLANTING.											

Worksheet 3-A. Alternatives - Technical Feasibility of Alternatives to Methyl Bromide

In this worksheet, you should address why an alternative pest management strategy on the list (see previous page) is or is not effective for your conditions. This worksheet contains 9 questions. You must complete one copy of worksheet 3-A for each resear

For worksheet 3-A you must complete one worksheet for each alternative, for each research study addressed. Please number the worksheets as follows. For the same alternative, first research study, label the worksheet 3-A(1)(a). For the same alternative,

When completing Section II, if you cite a study that is on the EPA website, you only need to complete questions 1, 5, and 8.

Summarize each of the research studies you cite in the Research Summary Worksheet.

If you prefer, you may provide the information requested in this worksheet in a narrative review of one or more relevant research reports. The narrative review must reply to Section I and questions 1 through 8 in Section II. A Research Summary Worksheet

BACKGROUND

EPA must consider whether alternative pest control measures (pesticide and non-pesticidal, and their combination) could be used successfully instead of methyl bromide by crop and circumstance (geographic area.) The Agency has developed a list of possible

There are three major ways you can provide the Agency with proof of your investigative work.

- (1) Conduct and submit your own research
- (2) Cite research that has been conducted by others
- (3) Cite research listed on the EPA website

Whether you conduct the research yourself or cite studies developed by others, it is important that the studies be conducted in a scientifically sound manner. The studies should include a description of the experimental methodology used, such as applicati

The Agency has posted many research studies on a variety of crops on its website and knows of more studies currently in progress. EPA will add studies to its website as they become publicly available. You are encouraged to review the EPA website and othe

In addition, EPA acknowledges that, for certain circumstances, some alternatives are not technically feasible and therefore no research has been conducted (i.e. solarization may not be feasible in Seattle). You should look at the list of alternatives pro

Use additional pages as needed.

Alternative: 1,3-D

Study: The Replant Problem and Its Management

Section I. Initial Screening on Technical Feasibility of Alternatives

1. Are there any location-specific restrictions that inhibit the use of this alternative on your site?

- 1a. Full use permitted _____
 - 1b. Township caps _____ X _____
 - 1c. Alternative not acceptable in consuming country _____
 - 1d. Other (Please describe) _____
- _____
- _____
- _____
- _____

If use of this alternative is precluded by regulatory restriction for all users covered by this application, the applicant should not complete Section II.

Worksheet 3-A. Alternatives - Technical Feasibility of Alternatives to Methyl Bromide

Section II. Existing Research Studies on Alternatives to Methyl Bromide

1. Is the study on EPA's website? Yes _____ No Can be found at www.uckac.edu/nematode/

1a. If not on the EPA website, please attach a copy.

2. Author(s) or researcher(s) Michael V. McKenry, Ph.D.

3. Publication and Date of Publication The Replant Problem and Its Management; July 1999

4. Location of research study California

5. Name of alternative(s) in study. If more than one alternative, list the ones you wish to discuss.
1,3-D

6. Was crop yield measured in the study? Yes _____ No X

7. Describe the effectiveness of the alternative in controlling pests in the study.
Lowest rate for success is 40 GPA; application to dry soil is key to reducing use rate, but this is in conflict with
regulations. Highest use rate allowed is 35 GPA, which is too low when applied to soils with high moisture content
as required by regulations. These restrictions limit effective use of 1,3-D to coarser textured soils.

8. Discuss how the results of the study apply to your situation. Would you expect similar results? Are there other factors that would affect your adoption of this tool?
Township caps and other use restrictions (rate and high soil moisture content requirements) limits the widespread
use and long lasting benefits of 1,3-D. Most growers will have to rent sprinkler pipe to obtain proper soil moisture.

Worksheet 3-A. Alternatives - Technical Feasibility of Alternatives to Methyl Bromide

In this worksheet, you should address why an alternative pest management strategy on the list (see previous page) is or is not effective for your conditions. This worksheet contains 9 questions. You must complete one copy of worksheet 3-A for each research study you use to evaluate a single methyl bromide alternative. Use additional pages as need.

For worksheet 3-A you must complete one worksheet for each alternative, for each research study addressed. Please number the worksheets as follows. For the same alternative, first research study, label the worksheet 3-A(1)(a). For the same alternative, second research study, label the worksheet 3-A(1)(b). For the first alternative, third research study, label the worksheet 3-A(1)(c). For the second alternative, first research study, label the worksheet 3-(A)(2)(a). For the second alternative, second research study, label the worksheet 3-(A)(2)(b).

When completing Section II, if you cite a study that is on the EPA website, you only need to complete questions 1, 5, and 8.

Summarize each of the research studies you cite in the Research Summary Worksheet.

If you prefer, you may provide the information requested in this worksheet in a narrative review of one or more relevant research reports. The narrative review must reply to Section I and questions 1 through 8 in Section II. A Research Summary Worksheet of relevant treatments should be provided for each study reviewed.

BACKGROUND

EPA must consider whether alternative pest control measures (pesticide and non-pesticidal, and their combination) could be used successfully instead of methyl bromide by crop and circumstance (geographic area.) The Agency has developed a list of possible alternative pest control regimens for various crops, which can be found at <http://www.epa.gov/ozone/mbr> or by calling 1-800-296-1996.

There are three major ways you can provide the Agency with proof of your investigative work.

- (1) Conduct and submit your own research
- (2) Cite research that has been conducted by others
- (3) Cite research listed on the EPA website

Whether you conduct the research yourself or cite studies developed by others, it is important that the studies be conducted in a scientifically sound manner. The studies should include a description of the experimental methodology used, such as application rates, application intervals, pest pressure, weather conditions, varieties of the crop used, etc. All results should be included, regardless of outcome. **You must submit copies of each study to EPA** unless they are listed on the Agency website.

The Agency has posted many research studies on a variety of crops on its website and knows of more studies currently in progress. EPA will add studies to its website as they become publicly available. You are encouraged to review the EPA website and other websites for studies that pertain to your crop and geographic area.

In addition, EPA acknowledges that, for certain circumstances, some alternatives are not technically feasible and therefore no research has been conducted (i.e. solarization may not be feasible in Seattle). You should look at the list of alternatives provided by the Agency and explain why they cannot be used for your crop and in your geographic area.

Use additional pages as needed.

Alternative: 1,3-D, Chloropicrin Study: The Replant Problem and Its Management

Section I. Initial Screening on Technical Feasibility of Alternatives

1. Are there any location-specific restrictions that inhibit the use of this alternative on your site?

- 1a. Full use permitted _____
 - 1b. Township caps _____ X _____
 - 1c. Alternative not acceptable in consuming country _____
 - 1d. Other (Please describe) _____
- _____
- _____
- _____

If use of this alternative is precluded by regulatory restriction for all users covered by this application, the applicant should not complete Section II.

Worksheet 3-A. Alternatives - Technical Feasibility of Alternatives to Methyl Bromide

Section II. Existing Research Studies on Alternatives to Methyl Bromide

1. Is the study on EPA's website? Yes _____ No Can be found at www.uckac.edu/nematode/

1a. If not on the EPA website, please attach a copy.

2. Author(s) or researcher(s) Michael V. McKenry

3. Publication and Date of Publication The Replant Problem and Its Management; July 1999

4. Location of research study California

5. Name of alternative(s) in study. If more than one alternative, list the ones you wish to discuss.
1,3-D, Chloropicrin (Telone C17, Telone C35)

6. Was crop yield measured in the study? Yes _____ No x

7. Describe the effectiveness of the alternative in controlling pests in the study.
Premix formulations of 1,3-D and Chloropicrin are effective only when treatment rates of 1,3-D are at the maximum
(35 GPA) as described in Worksheet 3-A. The addition of chloropicrin does not appear to provide additional
nematode control.

8. Discuss how the results of the study apply to your situation. Would you expect similar results? Are there other factors that would affect your adoption of this tool?
See Worksheet 3-A. Removing use restrictions (remove township caps, increase use rates and remove soil
moisture requirement) would increase the adoption of this alternative.

Worksheet 3-A. Alternatives - Technical Feasibility of Alternatives to Methyl Bromide

In this worksheet, you should address why an alternative pest management strategy on the list (see previous page) is or is not effective for your conditions. This worksheet contains 9 questions. You must complete one copy of worksheet 3-A for each resear

For worksheet 3-A you must complete one worksheet for each alternative, for each research study addressed. Please number the worksheets as follows. For the same alternative, first research study, label the worksheet 3-A(1)(a). For the same alternative,

When completing Section II, if you cite a study that is on the EPA website, you only need to complete questions 1, 5, and 8.

Summarize each of the research studies you cite in the Research Summary Worksheet.

If you prefer, you may provide the information requested in this worksheet in a narrative review of one or more relevant research reports. The narrative review must reply to Section I and questions 1 through 8 in Section II. A Research Summary Worksheet

BACKGROUND

EPA must consider whether alternative pest control measures (pesticide and non-pesticidal, and their combination) could be used successfully instead of methyl bromide by crop and circumstance (geographic area.) The Agency has developed a list of possible

There are three major ways you can provide the Agency with proof of your investigative work.

- (1) Conduct and submit your own research
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Whether you conduct the research yourself or cite studies developed by others, it is important that the studies be conducted in a scientifically sound manner. The studies should include a description of the experimental methodology used, such as applicati

The Agency has posted many research studies on a variety of crops on its website and knows of more studies currently in progress. EPA will add studies to its website as they become publicly available. You are encouraged to review the EPA website and othe

In addition, EPA acknowledges that, for certain circumstances, some alternatives are not technically feasible and therefore no research has been conducted (i.e. solarization may not be feasible in Seattle). You should look at the list of alternatives pro

Use additional pages as needed.

Alternative: 1,3 -D, Metam Sodium

Study: The Replant Problem and Its Management

Section I. Initial Screening on Technical Feasibility of Alternatives

1. Are there any location-specific restrictions that inhibit the use of this alternative on your site?

- 1a. Full use permitted _____
 - 1b. Township caps _____ X _____
 - 1c. Alternative not acceptable in consuming country _____
 - 1d. Other (Please describe) _____
- _____
- _____
- _____
- _____

If use of this alternative is precluded by regulatory restriction for all users covered by this application, the applicant should not complete Section II.

Worksheet 3-A. Alternatives - Technical Feasibility of Alternatives to Methyl Bromide

Section II. Existing Research Studies on Alternatives to Methyl Bromide

1. Is the study on EPA's website? Yes _____ No Can be found at www.uckac.edu/nematode/

1a. If not on the EPA website, please attach a copy.

2. Author(s) or researcher(s) Michael V. McKenry

3. Publication and Date of Publication The Replant Problem and Its Management; July 1999

4. Location of research study California

5. Name of alternative(s) in study. If more than one alternative, list the ones you wish to discuss.

1,3-D, metam sodium

6. Was crop yield measured in the study? Yes _____ No x

7. Describe the effectiveness of the alternative in controlling pests in the study.

1,3-D (shanked or drenched) at 35 GPA followed by a sprinkler application of metam sodium at a rate of 250 ppm
has been shown to be as effective as methyl bromide (tarped).

8. Discuss how the results of the study apply to your situation. Would you expect similar results? Are there other factors that would affect your adoption of this tool?

Having sprinkler lines in place during 1,3-D application is necessary for subsequent metam sodium application.
Amount of water used during sprinkler application depends on soil texture. Growers are not typically set up to
make sprinkler applications of metam sodium, requiring purchase or lease of equipment.

Worksheet 3-A. Alternatives - Technical Feasibility of Alternatives to Methyl Bromide

In this worksheet, you should address why an alternative pest management strategy on the list (see previous page) is or is not effective for your conditions. This worksheet contains 9 questions. You must complete one copy of worksheet 3-A for each resear

For worksheet 3-A you must complete one worksheet for each alternative, for each research study addressed. Please number the worksheets as follows. For the same alternative, first research study, label the worksheet 3-A(1)(a). For the same alternative,

When completing Section II, if you cite a study that is on the EPA website, you only need to complete questions 1, 5, and 8.

Summarize each of the research studies you cite in the Research Summary Worksheet.

If you prefer, you may provide the information requested in this worksheet in a narrative review of one or more relevant research reports. The narrative review must reply to Section I and questions 1 through 8 in Section II. A Research Summary Worksheet

BACKGROUND

EPA must consider whether alternative pest control measures (pesticide and non-pesticidal, and their combination) could be used successfully instead of methyl bromide by crop and circumstance (geographic area.) The Agency has developed a list of possible

There are three major ways you can provide the Agency with proof of your investigative work.

- (1) Conduct and submit your own research
- (2) Cite research that has been conducted by others
- (3) Cite research listed on the EPA website

Whether you conduct the research yourself or cite studies developed by others, it is important that the studies be conducted in a scientifically sound manner. The studies should include a description of the experimental methodology used, such as applicati

The Agency has posted many research studies on a variety of crops on its website and knows of more studies currently in progress. EPA will add studies to its website as they become publicly available. You are encouraged to review the EPA website and othe

In addition, EPA acknowledges that, for certain circumstances, some alternatives are not technically feasible and therefore no research has been conducted (i.e. solarization may not be feasible in Seattle). You should look at the list of alternatives pro

Use additional pages as needed.

Alternative: Metam Sodium Study: The Replant Problem and Its Management

Section I. Initial Screening on Technical Feasibility of Alternatives

1. Are there any location-specific restrictions that inhibit the use of this alternative on your site?

- 1a. Full use permitted _____
 - 1b. Township caps _____
 - 1c. Alternative not acceptable in consuming country _____
 - 1d. Other (Please describe) _____
- _____
- _____
- _____
- _____

If use of this alternative is precluded by regulatory restriction for all users covered by this application, the applicant should not complete Section II.

Worksheet 3-A. Alternatives - Technical Feasibility of Alternatives to Methyl Bromide

Section II. Existing Research Studies on Alternatives to Methyl Bromide

1. Is the study on EPA's website? Yes _____ No Can be found at www.uckac.edu/nematode/

1a. If not on the EPA website, please attach a copy.

2. Author(s) or researcher(s) Michael V. McKenry

3. Publication and Date of Publication The Replant Problem and Its Management; July 1999

4. Location of research study California

5. Name of alternative(s) in study. If more than one alternative, list the ones you wish to discuss.
Metam Sodium

6. Was crop yield measured in the study? Yes _____ No X

7. Describe the effectiveness of the alternative in controlling pests in the study.
Metam sodium performs erratically and inconsistently due to its poor fumigant attributes. It does kill shallow roots
at 250 ppm by drenching. Metam sodium can be as effective as methyl bromide when applied at twice the label
rate, which is not legal. New delivery systems are being investigated to deliver metam sodium through soil in water,
but availability is limited.

8. Discuss how the results of the study apply to your situation. Would you expect similar results? Are there other factors that would affect your adoption of this tool?
Erratic results and difficulty of obtaining good distribution in soil is a limiting factor. Availability of economical and
commercial equipment that can distribute the material through the soil must occur for widespread adoption of
metam sodium.

Worksheet 3-B. Alternatives - Pest Control Regimen Costs for Alternative:

Not Available (see comments)

If a consortium is submitting this application, the data for this table should reflect a representative user .												
Col. A: Name of Product and Non-chemical Control	Enter all alternatives and non-chemical pest control that would replace one treatment of methyl bromide throughout the fumigation cycle. See the Fumigation Cycle Worksheet for a comprehensive definition of the fumigation cycle. If multiple crops are grown during the interval between fumigations (e.g. tomatoes followed by peppers in a single growing season, or strawberries followed by lettuce over 2 or 3 years) include all of the pesticides that replace methyl bromide for the entire interval. Do not include pesticides that are used along with methyl bromide--enter only the additional pest control if methyl bromide were not available. If someone other than the applicant previously benefited from the application of methyl bromide in the fumigation cycle and you do not have the quantitative data for the crops grown on the same land, please indicate so in the comments section below.											
Col. B: Target Pests	Be as specific as possible regarding the species or classes of pests controlled by the active ingredient or pesticide product.											
Col. C: Active Ingredients	Use one row for each active ingredient (ai). For example, if a product contains 2 ai's use 2 rows for that product. Once a row is completed for a given product, then only Col. B (if applicable), C, and E need to be completed for additional rows regarding the same product.											
Col. D: Formulation	Enter the formulation or the % of active ingredient.											
Col. E, F, G: Application Rate	As a cross check, EPA is requesting both the amount of active ingredient in Col. E and product applied per area in Col. F. Indicate the unit of the product in Col. G.											
Col. H, I, J: Prices and Costs	Use 2001 prices and costs. If the product is custom applied you may enter the total cost in the last column (Col. M) and override the formula. If a pesticide is applied by the user, enter the price of the product in Col. H and the cost of applying it in Col. I. Enter any other costs associated with applying this product in Col. J, specifying what they are in the comments section at the bottom of this sheet.											
Col. K: Area Treated	Enter the area receiving at least one application of the pesticide.											
Col. L: # of Applications per Year	Enter the number of applications in a fumigation cycle comparable to methyl bromide for this alternative pest control regimen. Since this number is an average, it does not need to be a whole number.											
Col. M: Cost per Area in 2001 Dollars	Enter the cost per area in 2001 dollars. Col. M will be calculated automatically using the data you have entered for a chemical pest control, or, the formula in Col. M can be overridden if the cost per area is known because the product was custom applied.											
Non-chemical Control	Enter data near the bottom of the form. Identify the control in Col. A. Enter the target pests in Col. B. Describe the non-chemical pest control Col. B-L. Enter the costs in Col. M in 2001 dollars.											
Area is defined below as follows for each user: acres for growers, cubic feet for post-harvest operations, and square feet for structural applications.												
A	B	C	D	E	F	G	H	I	J	K	L	M
Name of Product	Target Pests	Active Ingredients (ai) in Product	Formulation of Product	Application Rate			Price per Unit of the Product	Cost of Applying Pesticide per Area	Other Costs per Application	Area Treated at Least Once	# of Applications per Year	Cost per Area (2001\$)
				lbs. ai per Area per Application	Units of product per Area per Application	Product Unit (e.g., lbs., gals)						
												\$ 0.00
												\$ 0.00
												\$ 0.00
												\$ 0.00
												\$ 0.00
												\$ 0.00
												\$ 0.00
												\$ 0.00
												\$ 0.00
												\$ 0.00
												\$ 0.00
												\$ 0.00
												\$ 0.00
Non-Chemical Pest Control	Target Pests	Description										Cost/area
Total											\$ 0.00	
Comments: Not available at this time. Some costs are unknown because delivery systems required to apply alternatives are still in the research stage and currently theoretical.												

Worksheet 4. Alternatives - Future Research Plans

Please describe future plans to test alternatives to methyl bromide. (All available methyl bromide alternatives from the alternatives list should have been tested or have future tests planned.) There is no need to complete a separate worksheet for future research plans for each alternative - you may use this worksheet to describe all future research plans.

1. Name of study: See Below _____

2. Researcher(s): _____

3. Your test is planned for: _____

4. Location: _____

5. Name of alternative to be tested:

6. Will crop yield be measured in the study? Yes _____ No _____

7. If additional testing is not planned, please explain why. (For example, the available alternatives have been tested and found unsuitable, an alternative has been identified but is not yet registered for this crop, available alternatives are too expensive for this crop, etc.)

Research efforts will continue, but are not fully defined at this time. Research programs and funding are discussed during the fall and winter months.

Worksheet 3-D. Alternatives - Changes in Other Costs for Alternative:

Not available

If a consortium is submitting this application, the data for this table should reflect a <i>representative user</i> .	
Enter data only for costs (other than the cost of alternative pest control) that change as a result of using the alternatives instead of methyl bromide. Enter the whole cost, not just the incremental changes. Enter the cost in Col. B for custom operation costs, or in Col. C and D for operations done by user.	
Col. A: Operation or Cost Item	Identify the operations or cost items that change as a result of not using methyl bromide.
Col. B: Custom Operation Cost	Enter custom operation costs that change in Col. B.
Col. C, D, E: Costs per Area	Enter in Col. C and D, material and labor costs per area that change for operations done by user. The total cost per area is calculated automatically from the values you enter in Cols. C and D.
Col. F: Typical Equipment Used	Identify changes in the typical equipment used by the user as a result of not using methyl bromide. Please be specific such as tractor horsepower. No cost data are required in this column.

Area is defined below as follows for each user: acres for growers, cubic feet for post-harvest operations, and square feet for structural applications.

A	B	C	D	E	F
Operation or Cost Item	Custom Operation Cost per Area	Operation Done by User			Typical Equipment Used
		Material Cost per Area	Labor Cost per Area	Total Cost per Area	
				\$ 0.00	
				\$ 0.00	
				\$ 0.00	
				\$ 0.00	
				\$ 0.00	
				\$ 0.00	
				\$ 0.00	
				\$ 0.00	
				\$ 0.00	
				\$ 0.00	
				\$ 0.00	
				\$ 0.00	
				\$ 0.00	
Total Custom per Area	\$ 0.00		User Total per area	\$ 0.00	

Comments:
Not known at this time.

Worksheet 5. Additional Information

1. How will you minimize your use and/or emissions of methyl bromide?

- 1a. Check all methods you will use Nothing
 Tarpaulin (high density polyethylene)
 Virtually impermeable film (VIF)
 Cultural practices (please specify) _____

1b. Will you use other pesticides to reduce use of methyl bromide? Yes No

If yes please specify. When available and industry learns how and has the capability to use them.

1c. Other non-chemical methods: (please specify):

2. Do you have access to recycled methyl bromide? Yes No

If yes, how many pounds? _____ lbs.

3. Do you anticipate that you will have any methyl bromide in storage on January 1, 2005? Yes No

If yes, how many pounds? _____ lbs.

4. What is the cumulative amount spent to date by the user or consortium on research to develop alternatives to methyl bromide (beginning in 1992)? \$ >\$250,000

5. Other investments, if any, made to reduce your reliance on methyl bromide. Describe each investment and its associated cost.

6. Identify what factors would allow you to stop or reduce your use of methyl bromide (e.g. registration of particular pesticide; completion of research plan; capital outlay).

Effective alternatives that can be implemented into current practices, or with minimal expense.

When do you expect these to occur? Unknown

7. Range of acres farmed by growers included in this application? (insert number of users in each category)

- 1% 0-10 acres
- 4% 10-25 acres
- 25% 25-50 acres
- 35% 50-100 acres
- 20% 100-200 acres
- 10% 200-400 acres
- 5% over 400 acres

Worksheet 5. Additional Information (continued)

8. Range of square feet of the area to which applicants included in this application will apply methyl bromide? (insert number of users in each category)

- ___ 0 - 5,000 sq. ft.
- ___ 5,001 - 10,000 sq. ft.
- ___ 10,001 - 20,000 sq. ft.
- ___ 20,001 - 40,000 sq. ft.
- ___ 40,001 - 80,000 sq. ft.
- ___ 80,001 - 160,000 sq. ft.
- ___ over 160,000 sq. ft.

I certify that all information contained in this document is factual to the best of my knowledge.

Signature _____

Date _____

Print Name _____

Title _____

Information in this application may be aggregated with information from other applications and used by the United States government to justify claims in the national nomination package that a particular use of methyl bromide be considered "critical" and authorized for an exemption beyond the 2005 phaseout. Use of aggregate data will be crucial to making compelling arguments in favor of critical use exemptions. **By signing below**, you agree not to assert any claim of confidentiality that would affect the disclosure by EPA of aggregate information based in part on information contained in this application.

Signature _____

Date _____

Print Name _____

Title _____

Burden means the total time, effort, or financial resources expended by persons to generate, maintain, retain, or disclose or provide information to or for a Federal agency. This includes the time needed to review instructions; develop, acquire, install, and utilize technology and systems for the purposes of collecting, validating, and verifying information, processing and maintaining information, and disclosing and providing information; adjust the existing ways to comply with any previously applicable instructions and requirements; train personnel to be able to respond to a collection of information; search data sources; complete and review the collection of information; and transmit or otherwise disclose the information. Public reporting burden for this collection of information is estimated to average 324 hours per response and assumes a large portion of applications will be submitted by consortia on behalf of many individual users of methyl bromide. An agency may not conduct or sponsor, and a person is not required to respond to, a collection of information unless it displays a current OMB control number.

